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## Big data analysis on the impact of air pollutants on hospitalization of respiratory diseases in Shenzhen, China

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**Statement of the Problem:** Researches on air pollutants and their negative impact on public health in China is mostly concentrated in cities with certain pollution problems such as Beijing, Jinan and Shenyang, etc., and for cities with relatively low pollution levels, less research. Despite the rapid economic development, Shenzhen's air quality is still generally good. The characteristics of large cities and low pollution make Shenzhen have unique advantages in conducting air pollution and population health research and revealing the hospitalization of people in low-concentration air pollution environment.

**Methodology & Theoretical Orientation:** The data were used include daily inpatients' data whole of respiratory diseases in 98 hospitals, daily air pollutants (PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO) concentrations and meteorological and wind direction data all in Shenzhen, China from January 1, 2013 to December 31, 2013. The relationship between the concentration of atmospheric pollutants and the number of hospitalized patients with respiratory diseases was analyzed using a time series generalized additive model (GAM).

**Findings:** In the study of Shenzhen, the generalized additive model including single pollutants showed that there were lag and cumulative effects of SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO, PM<sub>10</sub> and PM<sub>2.5</sub> on the number of hospitalizations of respiratory diseases. Among them, the moving average value of SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> with lag accumulation of 8 days (Lay07) had the largest ER value associated with the number of hospital admissions for respiratory diseases, and O<sub>3</sub> had the largest ER value at 5 days (Lay04). The generalized additive model including multiple pollutants showed that both PM<sub>10</sub> and PM<sub>2.5</sub> had significant effects on the hospitalization of respiratory diseases, while the effects of SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub> and CO were not significant.

**Conclusion & Significance:** PM<sub>2.5</sub> and PM<sub>10</sub> are the primary pollutants affecting the hospitalization of public with respiratory diseases in Shenzhen, China.

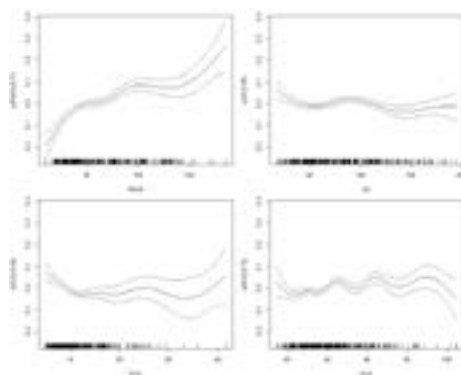


Figure. The effect of each air pollutant on Log (number of hospitalization) in Model.2 The dotted line is 95%CI, and the Y-axis label indicates degrees of freedom. (The figure of PM<sub>2.5</sub> is similar to the PM<sub>10</sub>'s)

**Recent Publications**

1. Tao Hu, Qingyun Du, Shi Liang\*, et al. 2014 Spatial Analysis of the Home Addresses of Hospital Patients with Hepatitis B Infection or Hepatoma in Shenzhen, China from 2010 to 2012. *Int. J. Environ. Res. Public Health* 11:3143-3155.
2. Yanxia Wang, Qingyun Du, Shi Liang\*, et al. (2014) Spatio-Temporal Variation and Prediction of Ischemic Heart Disease Hospitalizations in Shenzhen, China. *Int. J. Environ. Res. Public Health* 11:4799-4824.
3. Yuliang Xi, Fu Ren, Shi Liang\*, et al. (2014) Spatial Analysis of the Distribution, Risk Factors and Access to Medical Resources of Patients with Hepatitis B in Shenzhen, China. *Int. J. Environ. Res. Public Health* 11: 11505-11527.
4. Qingyun Du, Mingxiao Zhang, Shi Liang\* et al. (2016) Spatial Patterns of Ischemic Heart Disease in Shenzhen, China: A Bayesian Multi-Disease Modelling Approach to Inform Health Planning Policies. *Int. J. Environ. Res. Public Health* 13:436.
5. Yishu Zhu, Qingyun Du, Shi Liang\* et al. (2016) Location Optimization Using a Hierarchical Location-Allocation Model for Trauma Centers in Shenzhen, China. *ISPRS Int. J. Geo-Inform* 5:190.

**Biography**

Liang Shi, MD & PhD is the vice president and chief physician, Shenzhen Occupational Diseases Control and Treatment Center, China. He is also the postgraduate tutor of Jilin University, China. He dedicates to study occupational and environmental medicine, epidemiology, and health service management. He has won 1 municipal, 6 provincial and ministerial science and technology awards. He won the 2011 health management award of the Chinese medical association.

**Notes:**